

itself from every one of these small pipes, perhaps a dozen or more in a house, if it cannot be supplied more easily elsewhere.

The principles to be kept in view in dealing with defects such as those stated are obvious enough.

The general drain system of every street or district should be studied as regards its pneumatic relations, and means should be adopted for relieving the pressure within the system by ventilating outlets in safe positions. By placing charcoal strainers at all these outlets, sewer air would be deprived of its destructive qualities before passing into the streets. In special cases provision would have to be made for preventing the tide or strong winds from entering the mouth of the main sewer.

Then as regards the household drains. There is nothing easier than to ventilate the soil-pipes through charcoal filters in the manner stated. And as regards the numerous small pipes of sinks, baths, &c., not one of these ought on any account to communicate directly with a sewer. They ought all to be collected and allowed to discharge their contents in the open air over a trap communicating with the house drain, so that reflux of sewer gas into the house would be simply impossible.

Much evil has in times past arisen from imperfect drains within houses. Properly there should be none such. All connections of water-closets, sinks, baths, &c., with the house drain, should take place outside the house walls, and where from bad construction drains have been laid within houses and cannot be altered, they should be replaced by glazed earthen pipes laid in concrete, every joint made perfectly air-tight.

Cess-pits and traps ought never to be permitted within walls. The trapping should be all outside.

From want of attention to these long-known principles most of our houses are sick, and require separate diagnosis and treatment. They can all be cured if we only could find an authority to undertake the cure.

Were it not that in many instances we should have men of straw to deal with, we should feel disposed to advocate the application of Lord Campbell's Act to these cases. But as the recovery of damages would be a remote contingency, why should not Local Boards of Health, with their highly-paid health officers and surveyors, be required to see not only that all the details of water supply and drainage in new houses are safe, but that unsafe houses are made safe by their proprietors, or condemned as unfit for habitation?

After all is done, however, the chief remedy must be sought in technical training on all house questions in the application of which scientific principles are involved.

It may be safely stated that there is no technical subject of greater importance than this, and our recent experience has shown that there is no subject on which more training is necessary than to build a comfortable healthy dwelling.

SUTTON'S VOLUMETRIC ANALYSIS

Volumetric Analysis. By F. Sutton. Second Edition. (London: J. and A. Churchill.)

THE present volume is almost the only representative of a considerable branch of chemistry. We are surprised that Volumetric Analysis has not come into more

general use amongst chemists, for the saving of time in most instances is very great, whilst for accuracy it frequently surpasses gravimetric analysis. Since the last edition of this work was published (1863), chemistry has made great advances; in volumetric analysis there has been a gradual extension and development, although nothing very new or startling has taken place during this period. This edition is a far more handsome volume than the last, the type and engravings being everything that can be desired. The author states in his preface that the new system of atomic weights has been adopted; the nomenclature also has been changed to a great extent, although we are sorry to find that the system adopted is by no means perfect. Thus we read of "the carbonates of lime, baryta, and strontian" (p. 26), whilst in a later part of the book such terms as "hydric chloride," &c., are met with. These of course are extreme cases; would it not have been better to have adopted some definite system throughout the book? We regret to say that the larger portion of the book is disfigured by a great number of small errors; for instance, the cross references in many cases are wrong, thus at page 80, the reader is referred to § 80, 2, for the determination of chlorides by Liebig's method, the paragraph referred to is an article "on the examination of raw phosphates and phosphatic manures." Again, we are told on p. 116 to refer to § 71 for the titration of phosphate, but this paragraph describes the estimation of sulphuretted hydrogen. We have noticed so many errors, some in formulæ, some in equations, and again in grammar, that, though making every allowance for printer's errors, we must conclude that the edition has been carelessly revised. There is one paragraph we should wish to call attention to, the first on p. 132, which we confess we have not been able to understand clearly. The number of new processes introduced is not large, nor are they of very great importance. We think, however, that methods such as the estimation of nitric acid by indigo might have been omitted, and that, for instance, the iron process for phosphoric acid might have been introduced. If Mr. Sutton would give, as far as possible, the precise cases for which each process is most suitable, we think the value of the book would be much increased. His long experience in these matters would render this addition of great importance, and would save much trouble.

Fifty-four pages of the volume are occupied by a description of the processes of water analysis (furnished by Mr. W. Thorp); this consists of a lengthy description of Frankland and Armstrong's process, which has undergone considerable modification, and a much shorter description of Wanklyn and Chapman's process. We look upon this part of the book as very valuable, for water analysis has now become quite a study, and such a clear and concise statement as that in the present volume will be found of great service to any one engaged in this work.

The last section of the book, consisting of seventy-four pages, is "On the Volumetric Analysis of Gases," contributed by Prof. H. McLeod. We cannot praise this portion of the volume too highly, the engravings are excellent, many of them we believe being from the original drawings of the author. We do not think that any student could do better than take this as his guide to gas analysis. It is the most clearly written and practical

account that we have seen in the English language, and we should be glad to see it still further extended by the author.

On the whole Sutton's "Volumetric Analysis" has certainly improved on the first edition, but with more care its value would have been much increased.

MORELET'S TRAVELS IN CENTRAL AMERICA

Travels in Central America, including Accounts of some Regions unexplored since the Conquest; from the French of the Chevalier Arthur Morelet. By Mrs. M. F. Squier. Introduction and Notes by E. G. Squier. (London: Trübner and Co., 1871.)

IN that portion of Central America which lies between Yucatan on the north and the city of Guatemala to the south, and bounded on the east by British Honduras, is a considerable tract of country which has remained almost unknown to Europeans since the Spanish conquest, and in which the traditions of the neighbouring States place vast aboriginal cities and wonderful enchanted lakes. To explore this region was the object of the adventurous expedition of M. Arthur Morelet, a French gentleman of leisure and extensive scientific acquirements. M. Morelet's natural history collections were deposited in the Museum of Paris, and described in the *Comptes Rendus* of the Institute; a new crocodile was named after him (which he pathetically declares to be the only result of the journey as far as fame to himself is concerned), and an account of his travels was printed for private circulation in his own country. In the volume before us a portion of this is now translated for the benefit of the American and English public. Although the work records no important or striking discoveries, it is a valuable and interesting contribution to the geography and natural history of an almost unknown district.

M. Morelet's journey was divided into two portions. The first was devoted to a visit to the ruins of the ancient city of Palenque, near the great river Usumasinta, in the western portion of the district. The existence of these ruins was not known till 1750, but they have been sufficiently described in the works of Dupaix, Stephens, and others. Notwithstanding the traditions of immemorial antiquity which hang around them, the author attributes their origin to the Toltecs, who, in the middle of the 7th century were in possession of Anahuac, where civilisation peaceably developed itself. Later, about the year 1052, they abandoned this region, and emigrated in a south-easterly direction, that is to say, into the provinces of Oaxaca and Chiapa. It is easy enough, therefore, he thinks, to arrive at the conclusion that Palenque was founded at this time, and was consequently contemporaneous with Mitla.

The second and more important portion of M. Morelet's expedition had for its special object a visit to the great lake of Itza, situated in the province of Peten. Although nominally within the territory of the Republic of Guatemala, and but a comparatively short distance from the British settlement of Belize, he was unable to obtain at any of the seaport towns of Yucatan any exact information as to the exact locality of, or the means of access to, this

mysterious region. Proceeding from Palenque up the Usumasinta River, his route then lay eastwards for upwards of a fortnight through virgin forests of great magnificence, abounding in insects of all kinds, and in many rare and curious birds, and with a floral vegetation of great interest and beauty. The author describes in particular the *Aristolochia grandiflora*, with a flower often not less than twelve to fifteen inches in diameter, the calyx resembling the figure of a swan suspended by its bill, but when full-blown assuming the form of the conventional cap of liberty, turned up with a violet velvet lining, and worn by the Indian children as a helmet.

The great lake variously referred to by chroniclers as that of Itza, of the Lacandones, and of Peten, is described by M. Morelet as having a circumference of upwards of twenty-six leagues, and a depth in most cases exceeding thirty fathoms. It is not fed by any river, or even brook, of importance, and has no outlet; how its waters are kept fresh is not described. Its shores are defined by a girdle of broken calcareous hills, which are more or less silicious. On an island situated near its south-western shore is the Indian town of Flores, the only one of importance in this vast, almost uninhabited, district. Its description, and the illustration, convey an idea of great beauty:—

"I was impressed with the magnificence of the landscape which presented itself from the eminence where the modern church is situated, and which was once occupied by the ancient temples of the Itzaes. The sky was clear, the waters of the lake of the loveliest azure, and the islands and bluff shores, indented with little bays, hemmed in by silvery belts of sand, were green and refreshing to the sight. The island of Peten itself is oval in shape, rising by a gentle slope from the water, and terminating in a platform of calcareous rocks. It is not large; one may make the circuit of it in a quarter of an hour. Its surface is covered with small stones, which are doubtless the remains of ancient edifices."

The necessities of life, both as to food and clothing, being very few in number, the inhabitants of Flores have little inducement to labour, and pass their days in luxurious idleness or nocturnal festivities, and their character is what might be expected from their habits of voluptuous ease, though without any strongly developed vices. As to the natural history of the district, the author describes as the most abundant mammalia three species of deer, the tapir, the peccary, a species of rabbit, an armadillo, the agouti, which commits great ravages on the crops, and several rodents. Among the birds he mentions particularly a small heron (*Ardea exilis*), two swallows, and a humming bird. Among the reptiles are a number of species hitherto undescribed, including a new turtle (*Emys areolata*) and the *Crocodilus Moreleti*, the capture of which nearly cost him his life. There are fifteen different kinds of fish in the Lake of Itza, which are almost without exception peculiar to it. Considering the isolation of the lake from all other water systems, this fact is of great interest to the student of the geographical distribution of animals, and of the origin of species. The flora is not described in detail, indeed throughout the book few plants are specifically named, unless of striking beauty or producing edible fruits. A suspicion of the accuracy of the author's knowledge of natural history is excited by the occurrence of such phrases, unless they be due to incorrect translation, as "invertebræ (*sic*) and